



POSTER PRESENTATION

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Role of adenosine stress perfusion CMR in guiding clinical decision making in pediatric and congenital cardiology: a single pediatric center experience

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Background

Compared to adults, coronary artery disease abnormalities, significant enough to warrant viability assessment and adenosine stress perfusion cardiac magnetic resonance (CMR) imaging, are rare in pediatric patients. As a result, the role of adenosine stress perfusion CMR as a routine clinical imaging tool in these patients has not been clearly defined. We aim to evaluate the impact clinically-indicated adenosine stress perfusion CMR on decision-making and follow-up strategy.

Methods

Medical records and CMR images of all adenosine stress perfusion CMR studies performed on pediatric patients between August 2009 and May 2013 at a single institution were retrospectively reviewed. All examinations were performed on a 1.5T Siemens Avanto MRI scanner. Patients ≤ 10 years old were examined under general anesthesia. Adenosine stress perfusion CMR protocol included adenosine at 140 $\mu\text{g/kg/min}$ for a target heart rate increase of 20% or infusion duration of up to 5 minutes and gadolinium of 0.1 mmol/kg. Institutional review board approved this study and all patients signed informed consent.

Results

Twenty-seven patients were enrolled (median age 14 years, range 1.4-18.2 years). Twenty-six patients completed the protocol with one study terminated due to extreme chest discomfort and nausea. In all completed

studies, a heart rate response of $>20\%$ was achieved. List of diagnoses and reasons for referral are reported in Table 1. 31% (8/26) of the patients had areas of inducible ischemia. Table 2 displays cardiac diagnoses, anatomical lesion on the coronary artery as proven by CMR or subsequent conventional x-ray angiography and clinical decision made after the results of the perfusion study for these patients. Two of the eight patients with areas of inducible ischemia underwent successful revascularisation, and repeat perfusion studies performed after the intervention showed no evidence of inducible ischemia.

Conclusions

This retrospective study demonstrates that adenosine stress perfusion CMR performed in pediatric patients can positively direct clinical decision-making. Lack of ionising radiation makes this an attractive investigation with which to monitor response to revascularisation.

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Table 1 Cardiac diagnosis and reason for referral.

Cardiac diagnosis	N	Reason for Referral (n)
ALCAPA post Coronary re-implantation	6	Chest pain (3) Routine (3)
Kawasaki disease	6	Abnormal echocardiogram (6)
Transposition of Great arteries post arterial switch	4	Chest pain (3) Abnormal EKG on exercise (1)
Dilated Cardiomyopathy	3	Abnormal EKG (2) Abnormal echocardiogram (1)
Homozygous familial hypercholesterolemia	2	Clinician's request (2)
Atretic left anterior descending coronary artery	1	Sudden collapse during exercise
Bicuspid aortic valve	1	Dyspnea on exercise
Aortic stenosis post Ross procedure	1	Chest pain
DORV post repair	1	Chest pain
Hodgkin's lymphoma post chemo and radio therapy	1	Chest pain
Takayasu's arteritis	1	Cardiac arrest

ALCAPA (Anomalous left coronary artery from pulmonary artery), EKG (Electrocardiogram), DORV (Double outlet right ventricle)

Table 2 Clinical Outcome of Positive Stress Test.

Patient	Age (years)	Cardiac diagnosis	Anatomical coronary lesion	Clinical decision
1	9 years	ALCAPA post repair	Focal stenosis of re-implanted left main coronary artery	Plan for surgical re-vascularization
2	14 years	TGA post ASO	Mild ostial stenosis of left main	Limit strenuous exercise
3	10 years	Kawasaki	Aneurysmal left main stem	Medical therapy
4	10 years	Kawasaki	Left main stem stenosis	Endovascular coronary stent implantation
5	15 years	Kawasaki	Aneurysmal LAD	Medical therapy
6	18 years	ALCAPA post repair	Not detected	Plan for coronary angiography
7	12 years	ALCAPA post repair	Focal stenosis of re-implanted left main coronary artery	After x-ray angiography increased follow-up surveillance
8	14 years	Takayasu's arteritis previous LIMA graft	Obstructed LIMA graft	Exercise testing

ALCAPA (Anomalous left coronary artery from pulmonary artery), TGA (Transposition of great arteries), ASO (Arterial switch operation), LAD (Left anterior descending artery), LIMA (Left internal mammary artery).

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